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APPLICATION FOR LETTERS PATENT

QUERY-BASED ELECTRONIC PROGRAM GUIDE

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RELATED APPLICATIONS

The present application is a continuation of U.S. patent application number 08/828,709, attorney docket number MS1-104US, filed on 03/31/1997 and entitled "Query-Based Electronic Program Guide".

TECHNICAL FIELD

This invention relates to entertainment systems, such as interactive television or interactive computing network systems, and to electronic program guides which operate in conjunction with these systems. More particularly, this invention relates to methods for operating electronic program guides using auto-generated and viewer-generated queries to identify programs or other programming information.

BACKGROUND OF THE INVENTION

Television viewers are very familiar with printed programming schedules that appear in daily newspapers or weekly magazines, such as TV Guide®. The printed program guide lists the various television shows in relation to their scheduled viewing time on a day-to-day basis.

Cable TV systems often include a channel with a video broadcast of the printed program guide. The cable channel is dedicated to displaying listings of programs available on the different available channels. The listings are commonly arranged in a grid. Each column of the grid represents a particular time slot, such as 4:00 p.m. to 4:30 p.m. Each row represents a particular broadcast or cable channel, such as ABC, PBS, or ESPN. The various scheduled programs or shows are arranged within the rows and columns, indicating the channels and times at

1 which they can be found. The grid is continuously scrolled vertically so that a
2 viewer watches a continuously refreshing set of programs within three or four time
3 slots.

4 Data for available programs is typically received by a cable system as a
5 plurality of data records. Each available program has a single corresponding data
6 record indicating a variety of information about the program such as its channel, its
7 starting and ending times, its title, names of starring actors, whether closed-
8 captioning and stereo are available, and perhaps a brief description of the program.
9 It is not difficult to format a grid such as described above from this type of data
10 records. The grid is typically formatted once at the cable system's headend and
11 broadcast repeatedly and continuously to the thousands of homes served by the
12 cable system.

13 Newer, interactive cable distribution systems feature electronic program
14 guides (EPGs) which function somewhat similar to the broadcast program listing
15 channels described above. Rather than scrolling automatically, however, an EPG
16 allows a viewer to use a remote control device or other input device to scroll as
17 desired both horizontally and vertically through a program grid. This functionality
18 utilizes the two-way communications capabilities of interactive cable systems.

19 The EPG is typically implemented in software which runs on a set-top box
20 (STB) connected between a TV and a cable system home entry line. When
21 scrolling to a new column or row, the set-top box inserts the appropriate
22 programming information into each new row or column. This information is either
23 cached at the STB, or requested from the cable system's headend.

24 Interactive systems permit viewers to control what programs are shown on
25 their TV and when. Movies-on-demand is one example of this interactive control.

1 A viewer can peruse a list of available movies from the EPG, and then order a
2 selected movie. The STB sends a request for the movie to the headend server. The
3 movie is retrieved and transmitted to the requesting STB. Movies-on-demand thus
4 enables viewers to shop, purchase, and watch a movie at their convenience, as
5 opposed to being restricted to certain start times as is typical with conventional
6 premium or pay-per-view channels.

7 Many industry and commercial experts expect entertainment systems to
8 evolve to the point of offering many other interactive services to the consumers.
9 For instance, consumers will be able to use their TV or computer to shop for
10 groceries or other goods, conduct banking and other financial transactions, play
11 games, or attend educational courses and take exams.

12 Conventional distribution networks support many channels. It is common
13 for a TV audience to have 50 to 100 channels. However, as technology improves
14 and programming content continues to expand, the number of channels are
15 expected to increase dramatically to many hundreds, or even thousands of
16 channels.

17 One problem with the growth in the number of channels is that vastly
18 enlarged selection, while appealing to a viewer, will make it more difficult for a
19 viewer to locate programs of their preference. Traditional methods of locating
20 programs—such as memorizing channel numbers, scanning program grids, or
21 random surfing—will become less effective as the number of channels increase.
22 For example, imagine the difficulty in trying to present hundreds or thousands of
23 programs in a scrollable grid-like EPG user interface (UI), which might show only
24 a few programs or channels at one time. This UI structure will most likely be
25 unworkable for large program and channel offerings. Additionally, surfing through

1 hundreds or thousands of channels will likely consume a large amount of time,
2 causing the viewer to miss the programs he/she is attempting to find.

3 It is also likely that the traditional practice of relating programs and
4 networks to specific channels will become less meaningful as the number of
5 channels increases. Suppose, for example, a viewer might be interested in
6 watching football. Today, a viewer might remember that channel 6 (NBC) and
7 channel 3 (FOX) carry the football games and simply tune to one of these
8 channels. In the future, however, there might be football games being broadcast
9 on channels 78, 495, and 1042. These channels might be small local stations that
10 are broadcasting their local football team, or one of many channels used by a major
11 network. Viewers are not likely to remember that channels 78, 495, and 1042 are
12 carrying football games at specific times.

13 Moreover, the correlation of channels to networks and programs vary from
14 market to market. For instance, the sports network ESPN might be carried on
15 channel 15 in one market and on channel 29 in another market. Memorizing
16 program offerings in terms of channel numbers will prove frustrating as a viewer
17 travels from one market to the next.

18 Accordingly, there is a need to develop operating methods which allow
19 viewers to easily find programs or networks regardless of the channels on which
20 they are carried. Additionally, these operating methods should enable viewers to
21 locate programs regardless of whether they remember the channel number,
22 program name, or network name.

23 Toward this end, a company named TVHost, Inc. has developed a software-
24 based product "ETV" which assists a viewer in locating particular programs. The
25 ETV system organizes the different program offerings according to different

1 topical categorizes. Fig. 1 shows an example screen display of a graphical user
2 interface (UI) window 20 supported by the ETV system. The ETV window 20 has
3 a first pane 22 that lists alphabetically predefined types of programs, such as
4 Business, Children, Educational, Game Shows, and so forth. The viewer can
5 control a focus frame or highlight bar 24 to choose a type of program from the first
6 pane 22. A second pane 26 contains a list of programs that are available for the
7 program type highlighted in the first pane 22. In this example, the type "business"
8 is highlighted, and hence business-related programs are shown in the second pane
9 26. The second pane 26 also provides other programming information including
10 start time, network or station, and duration.

11 The ETV system thereby offers an alternative to a scrollable grid
12 presentation which organizes programs according to type. This allows the viewer
13 to select a program type, and then review the programs offered for this type. The
14 ETV system also permits rudimentary "search" capabilities. Fig. 2 shows another
15 graphical UI window 30 which appears when performing a search. A first pane 32
16 contains a scrollable alphabetized list of stations, and allows a viewer to choose a
17 station. A second pane 34 contains a scrollable alphabetized list of program types
18 from which the viewer may select a program type. Other parameters, such as
19 MPAA, rating, and start time, can also be selected by the viewer. Based upon
20 these selections, the ETV system locates programs which are of a particular type,
21 from the selected station, and satisfy the ratings and start times.

22 The ETV system is limited in many respects. The ETV system does not
23 permit searches on arbitrary fields. Instead, the categories are predefined for the
24 viewer. The viewer is not able to define his/her own complex searches using, for
25 example, Boolean logic of "OR," "AND," and "NOT." Another limitation is that

1 the ETV system does not provide any active controls which intelligently narrows
2 selections based upon viewer selections. An "active" control is a control that does
3 not require any other action on the part of the user. For instance, if a viewer
4 selects a station in pane 32 of the search window 30 (Fig. 2), all program types will
5 be listed in the second pane 34. In fact, the same lists will always occur in both the
6 first and second panes 32, 34 regardless of what selections the viewer has
7 previously made. The viewer is not able to see any results until the viewer
8 activates a "Begin" search key 36.

9 Accordingly, there remains a need to develop operating methods which
10 decouple associations between the channel and network or program and also allow
11 intelligent search procedures to better assist the viewer in locating preferred
12 programs.

13 14 **SUMMARY OF THE INVENTION**

15 This invention concerns an electronic program guide (EPG) which enables
16 creation of queries to facilitate simple and complex searches across predefined and
17 arbitrary fields. The EPG organizes and presents programming information to a
18 viewer. The EPG is implemented in software which executes on a processor
19 resident in a viewer computing unit. As described herein, the viewer computing
20 unit can be implemented as a set-top box (STB) connected to a television (TV), as
21 a computer and monitor, or the like.

22 According to one aspect of this invention, the EPG is configured to
23 automatically identify programs that a viewer is likely to prefer. The EPG collects
24 viewing preferences of a viewer by, for example, monitoring and logging viewing
25 habits of the viewer or through creation of a viewer profile in which a viewer

1 answers a series of questions designed to discover the viewer's likes and dislikes.
2 Based upon the these viewer preferences, the EPG automatically develops queries
3 for identifying programs that the viewer is likely to watch and presents those
4 programs to the viewer.

5 The EPG can further be configured to merge the queries of individual
6 viewers into a composite query which searches for programs on behalf of all
7 viewers. Each viewer defines his/her own query. For instance, one family
8 member might define a query for college basketball games, another family member
9 might define a query for Civil War programs, and another family member might
10 define a query for cartoons. The EPG then creates a unified query which combines
11 the three queries to jointly identify programs which satisfy any one of the three
12 queries.

13 The EPG saves queries in a hierarchic structure to make it easy for a viewer
14 to organize and retrieve queries. The viewer can define directories and sub-
15 directories to organize the queries. For instance, a viewer might arrange queries
16 for different kinds of movies within a Movie directory and queries for sports
17 within a Sports directory. Another example organization is to arrange queries
18 within separate user directories.

19 According to another aspect, the EPG is configured to run queries in
20 background so that the queries are periodically executed unbeknownst to the
21 viewer. When the EPG identifies a particular program satisfying the background
22 query, the EPG automatically notifies the viewer of the program and/or
23 automatically initiates procedures to record the program. For example, suppose a
24 viewer wants to watch shows on the Great Wall of China. The viewer can define a
25 query for identify any programs mentioning the Great Wall and have the query

1 execute in background, perhaps for a long duration of time. As the EPG identifies
2 programs on the Great Wall, the EPG notifies the viewer of when the program is
3 scheduled to be shown, and to initiate recording procedures.

4 According to another aspect of this invention, the EPG assists a viewer in
5 finding a program, channel number, or network by using a 10-key keypad as
6 typically found on remote control handsets. The keypad has ten numerical keys,
7 which also correspond to associated letters. When the viewer presses a key, the
8 viewer might intend to be entering a number to find a channel, or one of the letters
9 associated with the key for spelling the program or network name. Regardless of
10 the viewer's intent, the data generated when the key is depressed is the same. The
11 EPG is configured to interpret the data as representing all possible choices,
12 including the number and letters associated with the key. For instance, when a
13 viewer depresses the number "5" key, the EPG interprets that data to mean "5" or
14 "J" or "K" or "L." The EPG then identifies programs, channels, and networks
15 which begin with or contains the number or letters. As the viewer continues to
16 enter each digit, the list of programs, channel, and networks dynamically narrows.
17 After a few button presses, the viewer is presented with a short list of possible
18 choices.

19 20 **BRIEF DESCRIPTION OF THE DRAWINGS**

21 Fig. 1 is an exemplary screen illustration of a graphical user interface (UI)
22 window presented by a prior art product which organizes programs into predefined
23 categories.
24
25

1 Fig. 2 is an exemplary screen illustration of a graphical user interface (UI)
2 window presented by the prior art product which assists a viewer in searching the
3 predefined categories to locate certain kinds of programs.

4 Fig. 3 is a diagrammatic illustration of an entertainment system.

5 Fig. 4 is a simplified example of data fields in a data structure maintained
6 by an electronic program guide (EPG).

7 Fig. 5 is a block diagram of a viewer computing unit.

8 Fig. 6 is an exemplary screen illustration of an EPG UI, and particularly, a
9 screen having a scrollable grid with program listings.

10 Fig. 7 is an exemplary screen illustration of an EPG UI, and particularly, a
11 screen used to help create simple queries for searching the EPG.

12 Fig. 8 is an exemplary screen illustration of an EPG UI, and particularly, a
13 screen used to help create more advanced queries for searching the EPG.

14 Fig. 9 is a diagrammatic illustration of how a query filters the program
15 database of the EPG to identify programs satisfying the parameters of the query.

16 Fig. 10 is a diagrammatic illustration of how a restrictive query filters the
17 program database of the EPG to identify and prevent programs satisfying the
18 parameters of the query from being displayed.

19 Fig. 11 is an exemplary screen illustration of an EPG UI, and particularly, a
20 screen used to manage queries for multiple viewers.

21 Fig. 12 is a diagrammatic illustration of how individual queries can be
22 merged into a composite query used to search the program database of the EPG.

23 Fig. 13 is a diagrammatic illustration of how program information is filtered
24 through multiple queries to provide a short set of programs that are ultimately
25 displayed to the viewer.

1 Fig. 14 is a diagrammatic illustration of how program information in an
2 EPG database and other content information in a Web cache are filtered using
3 multiple queries to provide a short set of programs that are ultimately displayed to
4 the viewer.

5 Fig. 15 is an exemplary screen illustration of an EPG UI, and particularly, a
6 screen used to locate a particular channel, network name, or program name and to
7 create queries which search for them simultaneously.

8 9 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

10 Fig. 3 shows an entertainment system 40 according to one implementation
11 of this invention. System 40 includes a centralized headend or content provider 42
12 which is configured to provide continuous video content programs to multiple
13 subscribers. Programs provided by content provider 42 might include traditional
14 broadcast TV shows, on-demand movies, games, and other services such as those
15 commonly provided in the past by on-line computer services.

16 The content provider 42 supplies video and other data over a distribution
17 network 44 to the subscribers. In this implementation, the network 44 is a satellite
18 network which transmits the data in a digital format from the content provider
19 directly to individual subscribers. The satellite network 44 includes a transmitter
20 46, an orbiting satellite 48, and a receiver 50. As one example, the satellite
21 network 44 can be implemented using DSS (Direct Satellite System) technology,
22 where individual subscribers own small 18" receiving dishes 50 which are resident
23 at their homes. Video, audio, and other data are transmitted in digital format from
24 the satellite transmitter 46 to the orbiting satellite 48, where the data are redirected
25 to the satellite receiver 50.

1 The distribution network 44 can be implemented in other ways instead of
2 DSS technology. One implementation is a multi-tier network which includes a
3 high-speed, high-bandwidth fiber optic cable network between the content
4 provider 40 and regional distribution nodes (not shown), and conventional home
5 entry lines, such as twisted-pair lines or coaxial cable, between the distribution
6 nodes and viewer computing units 60. Another network implementation might
7 include traditional RF broadcast technologies. The network can also be
8 constructed using a combination of wireless and wire-based technologies.

9 Another approach beside to broadcasting the content to the subscribers is by
10 multicasting the content over the Internet. With this approach, the content
11 providers transmit the data content to a designated multicast address on the
12 Internet. Subscribers listen to the multicast address to receive the primary content.

13 Each subscriber residence has at least one viewer computing unit 60. In the
14 illustrated implementation, the viewer computing unit 60 is embodied as a
15 broadcast enabled personal computer, or simply "broadcast PC." The broadcast
16 PC 60 has a large computer monitor 62, a processing unit 64, and input devices in
17 the form of remote keyboard 66 and/or remote control handset 68. The remote
18 keyboard 66 and handset 68 are remotely coupled to the processing unit 64 via a
19 wireless data link 70, such as infrared (IR) or radio (RF), although the remotes can
20 be directly connected. The broadcast PC 60 also includes an EPG database 72 and
21 a content separator 74, which are shown separately for illustration purposes, but
22 can be incorporated into the processing unit 64.

23 It is noted that the viewer computing unit 60 can be implemented in other
24 forms. For instance, the viewer computing unit 60 can be embodied as a set-top
25 box coupled to a conventional television. Another implementation includes a TV

1 or other visual display device, which has processing components incorporated
2 therein.

3 Content provider 42 is configured to originate the broadcast programs or to
4 rebroadcast programs received from another source, such as a satellite feed or
5 another cable system. In addition, the content provider 42 is configured to
6 maintain a database of programs 80, such as feature-length movies, past TV shows,
7 games, and other entertainment videos, which can be played individually to
8 requesting subscribers in an on-demand mode. These programs can be requested
9 via a back channel, such as a telephone link or Internet link (described below). In
10 the case of a cable based network, the cable might function as both distribution
11 channel and back channel to support interactivity. As technology continues to
12 improve, the receiver 50 might be replaced with a transceiver which is capable of
13 both receiving digital data from the satellite system, and transmitting data back
14 across the satellite system.

15 The content provider 42 includes a continuous media server 82 which
16 distributes the digital video data streams kept in the programs database 80. The
17 continuous media server and video program database are implemented, for
18 example, as a disk array data storage system consisting of many large capacity
19 storage disks. The video data streams of the movies are stored digitally on the
20 storage disks in predetermined or mapped locations. The locations of the video
21 data streams are kept in a memory map and each video data stream is accessed
22 through pointers to the particular memory location. The continuous media server
23 can service simultaneous requests for a program (even the same program) from
24 many viewers.

1 The content provider 42 also has an program information server 84 to serve
2 programming information to the viewer computing unit 60. The program
3 information server 84 is implemented as a structured query language (SQL)
4 database 86 with records containing information relating to available shows or
5 programs.

6 Fig. 4 shows an example data structure 88 for organizing programming
7 information within the EPG database 86. The data structure includes various data
8 fields 90 for holding programming information. The data fields contain program
9 titles, actor names, whether the program has closed captioning or stereo audio, the
10 scheduled time of the program, the network name, description text, and the like.
11 The data structure 88 holds pointer to locations within the storage subsystem of the
12 continuous media server 82 which identify storage locations of the programs
13 corresponding to the program records.

14 The data structure 88 might also contain target specifications (memory
15 pointer, hyperlink, etc.) to one or more target resources which maintain
16 supplemental content for the programs. The supplemental content can be stored at,
17 and served from, the content provider 42 or from an independent service provider.
18 The supplemental content can be text, hypermedia, graphics, video, picture, sound,
19 executable code, or other multimedia types which enhance the broadcast program.
20 Examples of possible supplemental content include interactive questions or games
21 related to the program, additional trivia on the movies or TV shows,
22 advertisements, available merchandise or other memorabilia, Web pages to
23 programs of similar type or starring the same actors/actresses, and so on.

24 With reference again to Fig. 3, the content provider 42 broadcasts multiple
25 programs for different networks and channels as one continuous digital data feed,

1 as is conventional in DSS. The EPG programming information is transmitted
2 along with the video and audio data. The data is compressed and placed in digital
3 transport packets for transmission over the satellite system. If desired, the data
4 pertaining to particular channels or programs can be scrambled. The receiver 50
5 de-scrambles and decompresses the data stream, and then reconstructs the video,
6 audio, and programming data from the digital transport packets. The content
7 separator 74 separates the video and audio data from the programming
8 information. The video/audio data is directed to a tuner in the viewer computing
9 unit 60 which selects a particular channel and displays the video on the monitor 62
10 and plays the corresponding audio. The viewer controls program selection using
11 the keyboard 66 or remote control handset 68. The programming information is
12 input to the EPG database 72. By caching the programming information in the
13 local EPG database 72, interactive functionality used to locate and select certain
14 programs from the EPG is handled locally.

15 The entertainment system 60 also includes an independent service provider
16 (ISP) 92 which distributes digital content to the viewer computing unit 60 over a
17 second network 94. An example of the second network 94 is a public network,
18 such as the Internet. The ISP 92 has an ISP host 96 and a content database 98 to
19 serve various multimedia content to the user. For instance, the ISP host 96 might
20 store one or more target resources (such as a Web page) that can be rendered by the
21 viewer computing unit 62.

22 According to the Fig. 3 arrangement, the viewer computing unit 60 receives
23 traditional broadcast, on-demand programs, and programming information from
24 the content provider 42. The viewer computing unit 60 also receives supplemental
25 interactive content from the content provider 42 or from the independent service

1 provider 92. The back channel for facilitating interactive control is provided
2 through network 94. The off-site supplemental information provided by the ISP 92
3 is correlated with the programs within the program records data structure 88 in
4 program information server 84. As shown in Fig. 4, programs with supplemental
5 content provided by other servers has a target specification listed in one of the data
6 fields.

7 Fig. 5 shows an example implementation of the viewer computing unit 60 in
8 more detail. It includes a mother board 100 having a processor 102 (e.g., x86 or
9 Pentium® microprocessor from Intel Corporation), a volatile memory 104, and a
10 program memory 106. The viewer computing unit 60 includes a digital broadcast
11 receiver 50, such as a satellite dish receiver (Fig. 3). The digital receiver 50
12 receives digital data broadcast over the satellite distribution network 44. The
13 receiver 50 is coupled to a tuner 110 which tunes to frequencies of the satellite
14 transponders in the satellite distribution network. The tuner 110 has one or two
15 primary components: a specialized digital broadcast tuner and/or a generalized
16 digital broadcast tuner. The specialized digital broadcast tuner is configured to
17 receive digital broadcast data in a particularized format, such as MPEG-encoded
18 digital video and audio data. The generalized digital broadcast tuner is configured
19 to receive digital data in many different forms, including software programs and
20 programming information in the form of data files.

21 The tuner 110 is connected to the mother board 100 via a multi-bit bus 112,
22 such as a 32-bit PCI (Peripheral Component Interconnect) bus. The EPG database
23 72 is shown connected to the PCI bus 112, but can alternatively be implemented as
24 part of a hard disk drive 146. The programming data received at the receiver 50 is
25 transferred over the PCI bus 112 to the EPG database 72. A decryption device (not

1 shown) for facilitating secure access to the broadcast enabled PC may also be
2 attached to the bus 112.

3 The viewer computing unit 60 has a video subsystem 114 connected to the
4 PCI bus 112. The video and audio data is transferred from tuner 110 over PCI bus
5 112 to the video subsystem 114. The video subsystem 114 includes circuitry for
6 decoding MPEG-encoded or other video data formats, although such circuitry can
7 alternatively be incorporated into the tuner 110 or motherboard 100. The video
8 subsystem 114 also includes video display drivers for driving a computer monitor
9 116.

10 The video subsystem 114 supports many peripheral devices, in addition to
11 the monitor 116. For instance, the video subsystem 114 might be connected to a
12 laser video player 118 for playing DVD (digital video disks), a game machine 120
13 for playing video games, and a VCR (video cassette recorder) 122 for recording
14 programs. The video subsystem 114 is adapted for connection to an analog
15 broadcast television system 124 to receive conventional TV signals from cable
16 television or RF broadcast television systems. This enables backwards
17 compatibility to analog TV systems.

18 The monitor 116 is preferably a VGA or SVGA monitor as is customary for
19 personal computers, as opposed to a standard television. In the illustrated
20 implementation, the viewer computing unit 60 does not convert the television-
21 related data into an NTSC (National Television System Committee) format. In this
22 manner, the viewer computing unit 60 is able to produce television data having
23 superior quality when displayed on the VGA monitor.

24 The viewer computing unit 60 also includes a second bus 130, such as an
25 ISA (Industry Standard Architecture) bus, coupled to the mother board 100. An

1 audio board 132 is coupled to the ISA bus 130 and serves as an interface with a
2 number of audio output devices, such as conventional speakers. An amplifier may
3 be coupled between the audio board and speakers if desired. The audio board is
4 also coupled to the video subsystem 114 to receive decoded audio signals. The
5 audio board 132 can be coupled to a stereo system 134, so that audio data can be
6 output to the stereo system for enhanced sound and recorded.

7 A CD ROM drive 136 is coupled to the ISA bus 130. The audio output
8 produced by the CD ROM drive 136 is passed to the audio board 132.

9 The viewer computing unit 60 includes a modem 138, such as a 14.4 or 28.8
10 kbps fax/data modem, coupled to the ISA bus 130. The modem 138 is connected
11 to a conventional telephone line and provides access to public networks, including
12 the Internet. The modem 138 can be used to access and download data and
13 supplemental content directly from an independent service provider. Additionally,
14 the modem 138 can be used for two-way communications with the content
15 provider serving the programs over the DSS network. Viewer requests for
16 programs can be transmitted over the back channel via the modem 138.

17 An input/output (I/O) adapter 140 is coupled to the ISA bus 130 to interface
18 with numerous I/O devices , including a digital tape driver 142, a floppy disk drive
19 144, and a hard disk driver 146. A remote receiver 148 is also coupled to the I/O
20 adapter 140 for receiving signals from the remote cordless keyboard 66 and remote
21 control handset 68 in an IR or RF format. Alternatively, the keyboard and handset
22 can be directly wired to the computer. The I/O adapter 140 further provides
23 conventional serial ports, including a COM1 port 150, a COM2 port 152, and an
24 LPT1 port 154. An IR transmitter (not shown) can be coupled to the COM1 port
25 150 to generate infrared signals to control electronic devices, such as stereo

1 equipment, VCR, and the like. The computer 60 can also be hooked directly to
2 these components.

3 The viewer computing unit 60 runs an operating system 160 which supports
4 multiple applications. The operating system 160 is loaded in memory 106 and
5 executes on the processor 102. The operating system 160 is preferably a
6 multitasking operating system which allows simultaneous execution of multiple
7 applications. The operating system 160 employs a graphical user interface
8 windowing environment which presents the applications or documents in specially
9 delineated areas of the display screen called "windows." One preferred operating
10 system is a Windows® brand operating system sold by Microsoft Corporation,
11 such as Windows® 95 or Windows® NT or other derivative versions of
12 Windows®. The remote keyboard 66 and handset 68 may include customized
13 keys suitable for use with a Windows® brand operating system. It is noted,
14 however, that other operating systems which provide windowing environments
15 may be employed, such as the Macintosh operating system from Apple Computer,
16 Inc. and the OS/2 operating system from IBM.

17 A channel navigator application 162 is stored in program memory 106 and
18 executes on the processor 102 to control the tuner 110 to select a desired channel
19 for receiving the video content programs. An EPG application 164 is stored in
20 program memory 106 and executes on the processor 102 to organize programming
21 information downloaded from the Program information server at the content
22 provider and cached in the EPG database 72. The EPG 104 supports a displayable
23 user interface (UI) which visually presents the programming information from the
24 EPG database 72 in a usable format for the viewer, as will be described below with
25 reference to Fig. 6. The EPG is also configured to enable the viewer to define

1 queries which intelligently identify and gather programs the viewer would like to
2 see.

3 The viewer computing unit 60 has a browser 166 which is kept in memory
4 106 and dynamically loaded on processor 102 when needed to render content, such
5 as a hypertext document, from an ISP or other content provider. The browser 166
6 can be implemented as a hyperlink browser, or more particularly, as an Internet
7 Web browser.

8 It is noted that the operating system and applications can be stored on the
9 hard disk driver 146, or other storage medium (floppy disk, CD ROM, etc.), and
10 loaded into the program memory for execution by the processor.

11 It is further noted that the broadcast enabled personal computer 60 is a fully
12 functional computer which can perform the typical desktop applications familiar to
13 computers. A variety of different applications can be loaded and executed on the
14 viewer computing unit. As an example, the viewer can run word processing
15 applications, spreadsheet applications, database applications, scheduling
16 applications, financial applications, educational applications, and so forth. The
17 viewer operates the applications using the keyboard 66.

18 Fig. 6 shows an example EPG UI 170 which is presented on a display 172.
19 The EPG UI 170 includes a channel panel 174, a time panel 176, a program grid
20 178, and a program summary panel 180. Channel panel 174 provides a vertical
21 scrolling list which displays multiple channel tiles 182 at any one time. Each
22 channel tile 182 includes a channel number and a channel name (typically the
23 network name, such as CBS, ABC, MTV, etc.), and might also include a channel
24 logo. The channel panel 174 defines rows of program titles in program grid 178.
25 Time panel 176 is a horizontal, continuous scrolling time line with markings

1 denoting half-hour time segments. Time panel 176 defines columns in program
2 grid 178.

3 Program grid 178 consists of multiple program tiles 184 organized in
4 channel-based y-axis and time-based x-axis. The grid is located to the right of
5 channel panel 174 and below time panel 176. Each program tile 184 has the
6 program title and any secondary program descriptive information, such as closed
7 caption, stereo, etc. The illustrated screen shows an example programming line-up
8 for 8:00 p.m. to 10:00 p.m. PST, Thursday, March 7, 1996. The program titles,
9 such as "Murder, She Wrote" and "Friends," are arranged horizontally with respect
10 to their networks CBS and NBC and vertically with respect to their start times of
11 8:00 p.m. PST. It is noted that many other grid or non-grid layouts may be
12 employed to present the program selections to the viewer. Additionally, although
13 the layout is shown organized according to channel number, the same information
14 can be presented in a channel absence presentation where no reference is made to
15 channel numbers.

16 The viewer controls the program selection with a single focus frame 186
17 which is graphically overlaid on the program grid 178. Focus frame 186 can be
18 moved up or down, or left and right within a channel line-up, to choose a desired
19 program. The remote control handset or keyboard (or other manipulating
20 mechanism) can be used to position the focus frame 186 within the EPG UI 170.

21 Program summary panel 180 includes a text description window 188 and a
22 preview window 190. The text description window 188 displays program
23 information related to the program that is highlighted by the focus frame 186 in
24 program grid 178. Here, the NBC program "Seinfeld" is highlighted and the text
25 description window 188 lists the program title "Seinfeld," and a program

1 description of the current episode. The text description window 188 might also
2 include other program related information like closed-captioning, stereo, etc. The
3 preview window 190 is used to display clips of the selected highlighted show, such
4 as a preview of the “Seinfeld” show.

5 The data to fill the various tiles and windows is drawn from the EPG
6 database 72 or from URL resources on the Internet 94. The data is maintained in
7 data structure 88 (Fig. 2) which is transmitted as program records from the content
8 provider over the satellite network to the viewer computing unit and cached in the
9 EPG database 72. The EPG application 164 inserts the appropriate data records
10 into the EPG UI 170 for display as the viewer maneuvers the focus frame 186
11 around the grid.

12 The EPG UI 170 also includes hyperlinks 192 which are supplied with the
13 program records received from the content provider, embedded in the program
14 stream, or provided in a data stream from arbitrary source which has been
15 associated with the program. The hyperlinks can be inserted into the channel tiles
16 182, program tiles 184, or the description window 188. In the Fig. 6 illustration,
17 the hyperlink “More” is provided in the description window 188 to reference target
18 resources that contain additional information about this episode of the “Seinfeld”
19 show. Other hyperlinks in the description window 188 include “Last Week” which
20 references a target resource containing information on the previous week episode,
21 and “Comedy Club” which links to a target resource having video coverage of
22 comedian Jerry Seinfeld performing at night clubs. The target resources
23 referenced by the hyperlinks might be located at the content provider or at an
24 independent service provider. The target resource might further be located locally,
25 having been pre-cached by the system. For instance, the system might pre-cache

1 supplemental information about certain shows before they air based on predictive
2 viewing tendencies, or as part of a promotional data broadcast advertising the
3 show. This permits local interactive functionality between the viewer and the
4 viewer computing unit, in addition to full network interactive functionality
5 between the viewer and the program provider.

6 The EPG UI 170 has special operator buttons 194-200 which arrange for
7 certain tasks. A "view full screen" button 194 allows the viewer to view the
8 program in full screen. A "record" button 196 allows a user to initiate procedures
9 to record a currently playing program, or schedule to record an upcoming program.
10 For scheduling, the viewer simply drags the record icon and drops it on a program
11 tile 184 of an upcoming program, as exemplified by the record icon dropped on the
12 "Caroline in the City" program tile.

13 A "remind" button 198 is used to set reminders which notify viewer's of
14 scheduled shows. A viewer might, for example, want to be reminded of a program
15 being played later in the day and hence, drag a reminder icon to the suitable
16 program tile 184. When the start time of the requested program approaches, the
17 EPG will notify the viewer through a pop-up icon or the like that the program is
18 about to begin. An "add to favorite" button 200 is provided to enable a viewer to
19 add a program to a predefined list of favorites.

20 The drag and drop aspects described above are preferably implemented
21 using object linking and embedding (OLE), which is commercially available from
22 Microsoft Corporation under a technology known as "ActiveX." OLE is an
23 extensible service architecture built on the Component Object Model (COM)
24 which is both language independent and location independent. OLE supports an
25 OLE Drag and Drop which is widely used in Windows®-compatible operating

1 systems, such as Windows® 95. OLE and COM have been well documented and
2 will not be explained in detail. For more information regarding OLE and COM,
3 refer to OLE 2 Programmer's Reference and Inside OLE 2, Second Edition, both
4 published by Microsoft Press of Redmond, Washington, and both of which are
5 hereby incorporated by reference.

6 The EPG UI 170 also presents predefined query buttons 202-210.
7 Activation of these query buttons trigger a query of the EPG database 72 to
8 identify programs satisfying the predefined query parameters. The EPG 106
9 enables a viewer to create their own queries and to produce a soft button on the
10 EPG UI 170 for quick retrieval of highly used queries. As an example, the EPG UI
11 shows queries for favorite programs, Star Trek programs, comedies, the Oprah
12 Show, and old movies. The “favorites” query button 202 recalls a list of programs
13 that the viewer has previously identified as favorites using the “add to favorite”
14 button 200, or which have been automatically defined as favorites by the EPG.
15 The “Star Trek” query button 204 and “Oprah” query button 208 initiate queries of
16 the EPG database 72 for all Star Trek and Oprah shows that might be playing
17 within a particular time frame. As the number of channels increases and
18 programming grows dramatically, several different channels might carry Star Trek
19 or Oprah, concurrently or at different times. The “comedies” query button 206
20 initiates a query of the EPG database 72 for all comedy programs. The “old
21 movies” query button 210 locates all old movies that are showing.

22 Some of the predefined query buttons are preset categories, such as the
23 “comedies” and “old movies” buttons, while other query buttons are defined by the
24 viewer, such as “Star Trek” and “Oprah” buttons. The preset category buttons can
25

1 be added and removed from the EPG UI through a separate window which allows
2 a viewer to add or subtract categories from a list of available categories.

3 According to one aspect of this invention, the EPG 164 is configured to
4 automatically develop queries to identify programs that a viewer is likely to want
5 to watch based on viewing preferences of the viewer. The EPG application
6 collects viewer preferences in a number of ways. One technique is to log the
7 amount of time that each channel is selected for viewing, with the underlying
8 assumption that the viewer is watching that channel. Each channel is then
9 assigned its own percentage of the entire viewing period as an indication of the
10 viewer's preferences. The EPG generates a query to identify channels based upon
11 this percentage, so that channels which the viewer tends to watch most often
12 appear at the top of the list and channels which the viewer tends to watch least
13 often appear at the bottom of the list. The EPG presents this list as a scrollable list
14 in the EPG UI , with the highly watched channels appearing at the top and the least
15 watched not appearing at all, but being available if the viewer wanted to scroll to
16 them. It is noted that the same technique can be applied to individual programs or
17 networks, where each program or network (rather than channel) is logged and the
18 list is ordered with the frequently watched programs being listed on top and the
19 least watched programs being listed on the bottom.

20 Another technique is to create a viewer profile for each viewer. The viewer
21 is asked a series of questions directed at discovering the viewer's likes and
22 dislikes. This question-and-answer session is accomplished using a separate
23 graphical UI which asks questions and enables viewers to choose among
24 responses, such as "strongly like," "like," "dislike," and "strongly dislike." Rather
25 than discrete answers, the question-and-answer screen might include sliders which

1 enable viewers to choose somewhere in a scale between opposing preferences of
2 “strongly dislike” and “strongly like.” The EPG compiles the viewer profile and
3 correlates the profile with clustering data to generate a query for possible
4 programs. The clustering data represents an accumulation of other viewers
5 preferences. By matching the viewer profile with similar profiles, the EPG can
6 better determine what the viewer will most likely want to watch.

7 Once the EPG 164 has automatically compiled a list of likely favorites, the
8 EPG presents the list in a UI screen. This screen can be called, for example, by
9 activating the “favorites” button 202 in EPG UI 170. The list is presented as its
10 own reduced, closed loop of available programs which has actively weeded out
11 less popular channels. The viewer can then surf the closed list by sequentially
12 cycling through the programs.

13 The EPG UI 170 also presents a “Find” button 212 which a viewer uses to
14 create his/her own query. Activation of the “Find” button 212 opens another UI
15 window which assists a viewer in creating a query. Fig. 7 shows an example find
16 window 220. The find window 220 presents various search parameters for the
17 viewer to search. In this example, the viewer can select a program genre from a
18 genre box 222, a program sub-genre from a sub-genre box 224, a rating from the
19 rating scale 226, a network name from the network box 228, and a program name
20 from the program box 230. Based on these parameters, the EPG constructs a query
21 and searches the EPG database 72 to locate programs satisfying the query. The
22 find window supports creation of two mutually exclusive types of queries: a
23 “find” query which locates all programs satisfying the search parameters and a
24 “find all except” query to locate all programs which do not satisfy the parameters.

1 In this example, the EPG has constructed a “find” query which located three
2 programs that satisfy the parameters of an action movie rated PG.

3 To produce more advanced queries, the viewer can select an advanced query
4 button 232. Fig. 8 shows an example advanced find window 240. It enables a
5 viewer to create particularized queries and organize them in a tabbed folder
6 arrangement. In this example, the viewer has defined three advanced queries
7 pertaining to “G-rated” programs, “Action” programs, and “No Sci-Fi” programs.
8 The advanced find window 240 includes parameters such as genre, sub-genre,
9 rating, network name, channel, program name, and time period. As new
10 parameters are added to the EPG database, new controls in the advanced find
11 window 240 are likewise added. It also allow a viewer to define a keyword. In
12 this example, the viewer wants to find all James Bond action movies on HBO
13 between 5:00 PM and 8:00 PM. Hence, the viewer enters the keyword “Bond” and
14 executes the query. If the viewer wanted to find a particular bond movie starring
15 Sean Connery, the viewer might enter a Boolean-like search “Bond AND Connery”
16 in the keyword control of the advanced find window.

17 The advanced find window 240 can also be used to create restrictive queries
18 which function to restrict or limit selection of programs for viewers without
19 appropriate permissions levels. For instance, parents can set permission levels for
20 their children so that when the children are logged onto the viewer computing unit,
21 the children are prevented from watching certain programming content or from
22 ordering certain services. A parent might, for example, wish to restrict a child
23 from watching an R or NC rated movies. To create a restrictive query, the parent
24 clicks the “don’t find” option to convert the query from an inclusive query to an
25 exclusive query.

1 An “add tab” button 242 and “remove tab” button 244 allow the viewer to
2 manage the queries. The viewer can also save queries by clicking on the “save”
3 button 246. Preferably, the queries are saved in a hierarchic query structure of the
4 EPG database. This enables viewers to define directories and sub-directories of
5 queries. Organizing queries in a hierarchic structure is advantageous because the
6 structure conforms to the computer side of the viewer computing unit and avails
7 itself to memory management applications and tools running on the computer. As
8 the number of saved queries grow, the query directories can be searched like other
9 data files directories, as is common in personal computers, to locate a particular
10 query. The query structure can also be presented in a UI to the viewer as an
11 organization chart showing the hierarchy of directories, sub-directories, and
12 queries. Individual queries can be saved as icons. To recall the query, the user
13 activates the icon.

14 The EPG can also be configured to support a query editor to allow the
15 viewer to create essentially any type of query based on key word descriptions, and
16 to edit such queries. One suitable type of editor which can be employed with the
17 EPG is a query editor used in a program entitled Cinemania95 by Microsoft
18 Corporation, which enables a computer user to create queries for locating cinema
19 trivia stored on the CD ROM.

20 To assist the viewer in defining a query (either by using the “Find” UI or the
21 query editor), the EPG can provide wizards which guide the viewer with step-by-
22 step instructions through the query creation. One example wizard for generating a
23 simple query is to ask the viewer if the program selected is chosen for its name, or
24 for its channel. A viewer might request to always be shown any program with one
25 name, or to never display a program with another name.

1 Once a query is defined, the viewer can execute the query to initiate a
2 search of the programming information in the EPG database 72. The queries
3 function as a filter which sifts through the programming information and returns
4 only those items which satisfy the parameters, or in the case of a restrictive query,
5 precludes those items that satisfy the parameters.

6 Fig. 9 is a diagrammatic illustration of how a query operates to filter out
7 programs which do not satisfy the criteria. Box 250 contains a representation of
8 programs found in the EPG database 72. Suppose a viewer defined a science
9 fiction (Sci-Fi) query using the advanced find window 240, as shown in Fig. 8, to
10 locate Sci-Fi programs. The EPG application 164 executes the Sci-Fi query 252
11 and winnows the program database to a short list of Sci-Fi programs, as presented
12 in box 254. This short list of Sci-Fi programs is then presented in the UI as a
13 closed loop list which can be cycled by the viewer for selection of a particular
14 program.

15 Fig. 10 demonstrates a restrictive query which functions to filter out and
16 remove programs which are prohibited under the query. In this example, the EPG
17 applies a restrictive query filter 256 to the program set 250 in the EPG database
18 which eliminates programs rated PG or R. The short list provided in box 258 is
19 without PG or R rated programs.

20 Figs. 11 and 12 illustrate another aspect of this invention in which the EPG
21 is configured to merge multiple queries into a unified query. Suppose, for
22 example, that multiple members in a family want to watch a program together, but
23 are not sure which program. Typically, each family member individually scans the
24 program listings, or surfs the channels, to find one or two programs they are most
25 interested in watching. After everyone is through with his or her independent

1 search, they discuss about which program to watch. The EPG 164 eliminates this
2 problem by creating complex composite queries which merge multiple simple
3 single queries.

4 Fig. 11 shows an example UI window 260 having a folder organization
5 which maintains queries for individual viewers. In this example, a family of
6 four—Dad, Mom, John, and Sue—each have their own tab and folder which lists
7 their personalized queries. That is, each family member has previously defined
8 one or more queries and stored them in their personal folder. The Mom folder
9 holds queries for musical programs, programs on France, and the Seinfeld
10 program. Table 1 shows the queries for all family members.

11
12 Table 1: Family Queries

<u>Family Member</u>	<u>Queries</u>
Dad	Sports, Comedies
Mom	Musicals, France, Seinfeld
John	Star Trek, Action
Sue	Cartoons, No R-rated

13
14
15
16
17
18
19 When the family sits down to watch a program together, one viewer can
20 execute a merge query that effectively combines these independent queries using,
21 for example, an OR function. The Boolean OR function returns a true result if any
22 one of the parameter sets is met. In Fig. 12, a program set 262 is filtered using
23 Dad's query filter(s) 264, Mom's query filter(s) 266, John's query filter(s) 268, and
24 Sue's query filter(s) 270. The programs satisfying at least one of these queries is
25 placed in the program pool 272, from which the family members can choose a

1 program. It is noted that the family filter can be alternatively set to combine using
2 a set intersect method or Boolean AND function which returns a program only if
3 the query parameter sets of each family member is met.

4 Notice that some programs are listed because they satisfy a single query
5 (e.g., US Open Golf is selected by Dad's query filter 264). Other programs may
6 satisfy more than one query. For example, the program "Seinfeld" satisfies Mom's
7 Seinfeld query and Dad's comedies query. The animated movie "Aristocats"
8 satisfies Mom's France query and Sue's cartoon query.

9 Fig. 13 illustrates the data flow for the programming data used by the EPG
10 application, and how the query filters act to pare the data. Suppose that the viewer
11 is watching the viewer computing unit 60 at 1:00 PM, as indicated by the clock
12 280. Broadcast digital video and audio data, along with the digital programming
13 data, are received from the satellite system at satellite receiver 50. The
14 programming data is cached in the local EPG database 72. In this illustration, the
15 EPG database is shown as having twelve programs with start times ranging from
16 1:00 PM to 8:00 PM. This represents a tiny fraction of available programs, as the
17 EPG database 72 can store thousands of programs that are available over hundreds
18 to thousands of channels.

19 The viewer has defined a restrictive query 282 that removes all Sci-Fi
20 programs from the active EPG UI 170. In this case, the programs "Star Trek,"
21 "Aliens," and "Star Wars" are eliminated from the EPG UI 170. Now, suppose the
22 viewer decides to watch CNBC Market Wrap at 1:00 PM. The viewer selects the
23 program by highlighting and clicking on the Market Wrap program tile in the EPG
24 UI 170. The tuner in the viewer computing unit tunes to the channel carrying the
25

1 selected program and the digital video data for Market Wrap is sent to the VGA
2 monitor.

3 According to another aspect of this invention, the viewer can define queries
4 that continue to execute in background. The viewer defines the query to identify a
5 topic of interest, such as any programs concerning the Great Wall of China or any
6 programs starring Clint Eastwood. The query is stored and periodically executed
7 to determine if there are any programs which relate to the topic. When the query
8 identifies a program related to the topic, the EPG automatically notifies the viewer.

9 Fig. 13 shows two queries that execute in background. The first query 284
10 identifies and notifies the viewer of all "Seinfeld" programs and the second query
11 286 identifies and notifies the viewer of all Clint Eastwood movies. When the
12 viewer looks at the upcoming schedule for 2:00 PM, the EPG UI 288 shows all
13 programs from the filtered version of the EPG UI 170 which show at 2:00 PM,
14 such as the US Open Golf and Seinfeld. The EPG UI 288 also shows any
15 programs identified by the background queries as a result of searching the EPG
16 database 72. Here, the background queries 284 and 286 identified a Seinfeld
17 program playing at 2:00 PM and a Clint Eastwood movie "Pale Rider" at 6:00 PM.
18 Since there is a conflict at 2:00 PM, the viewer can choose between the Seinfeld
19 program and the US Open Golf program.

20 Since the movie Pale Rider is not until 6:00 PM, the viewer can place a
21 notification icon 290 on the screen to remind him/her of the program. The viewer
22 clicks on the program, drags it from the EPG UI 288, and drops it at another
23 location on the screen. The drag-and-drop operation results in creation of an
24 instruction to tune the visual display unit to the program upon activation of the
25

1 icon. The EPG can flash the icon, or cause some other visual change, when the
2 start time of the program nears.

3 The EPG can also automatically create these reminders, without
4 intervention of the viewer. When the EPG identifies a program, such as Pale Rider
5 in response to the background query 286, the EPG can be configured to
6 automatically set an icon 290 on the screen for the viewer. The viewer can also set
7 an option for the EPG to initiate recording of the program in the event that the
8 viewer does not timely activate the icon prior to the scheduled viewing time. In
9 this manner, if the viewer is unable to watch the program at the schedule time, the
10 EPG intelligently queries the database for upcoming programs, identifies any
11 programs that meet the viewer's search parameters, notifies the viewer, and
12 records the program if the viewer is unable to watch it. There are other
13 triggerable events that may be set based on the queries, such as automatically
14 downloading information about the identified program, calling particular content
15 from the Web, or launching a purchasing application to purchase goods related to
16 the identified program.

17 This example illustrates concurrent use of multiple filters including
18 personal background filters and an active general filter. The EPG can be
19 configured to perform any number of queries, such as any restrictive queries for
20 the logged on viewers, then any general queries, and then any background queries
21 to filter the programs found in the EPG database to a manageable set of preferred
22 programs.

23 Another aspect of this invention is to provide queries which filter
24 information from the EPG database and from one or more Web sites on the
25 Internet. The query results can be presented to the user in a single UI. The queries

1 for the Web sites or other information on the Internet can be active queries that
2 readily filter during online communication with the Internet, or queries that filter
3 information in a local cache filled with Internet data.

4 Fig. 14 is similar to the arrangement of Fig. 13, but shows the effect of
5 queries operating on both the EPG database and an Internet Web site. Fig. 14
6 shows two queries, an EPG database query 282 which filters data in the EPG
7 database 72 to remove all science fiction programs and a Web cache query 292
8 which filters a Web cache 294 to locate only news programs. The Web cache 294
9 contains recently retrieved from one or more Web sites on the Internet.

10 The results of the two queries are displayed together on UI 296 to present a
11 list of options to the viewer. The viewer can optionally select programs served by
12 the content provider over the primary distribution network, or content served by
13 the Internet provider over the Internet. By using an integrated UI 296, the viewer
14 might be unaware as to the source of the content.

15 Fig. 15 shows a quick find window 300 supported by the EPG application
16 164 which presents another technique for creating a query. This technique enables
17 a viewer to enter data from a numeric keypad on the remote control handset. The
18 numeric keypad is a conventional 0-9 digit keypad. Numbered keys 2-9 also have
19 letters associated with them, similar to a conventional telephone, except the
20 number "7" key includes the letter Q and the number "9" key includes the letter Z.
21 Table 2 shows the association of the numbered keys and letters.

22
23 Table 2: Association of Letters to Numbered Keypad

<u>Key</u>	<u>Associated Letters</u>
1	

1	2	A, B, C
2	3	D, E, F
3	4	G, H, I
4	5	J, K, L
5	6	M, N, O
6	7	P, Q, R, S
7	8	T, U, V
8	9	W, X, Y, Z
9	0	

10

11 Suppose a viewer wants to watch a particular program or network, but
12 cannot remember what channel it is on. Remember, there are expected to be
13 hundreds or thousands of channels, and trying to locate a particular program or
14 network by memorizing each channel number may prove futile. To decouple the
15 association of channel numbers to networks and programs, the EPG enables the
16 viewer to enter data from the 10-key keypad for both channel numbers or letters in
17 the program or network name. The EPG performs the mapping to identify any
18 program, channel, or network that matches the entered data.

19 The quick find window 300 is activated by pressing one of the keys on the
20 remote control handset. With quick find active, the viewer presses individual keys
21 on the remote control handset to enter data, one digit at a time. As each key is
22 depressed, however, the EPG does not know if the viewer intends to enter a
23 number or a letter. Accordingly, for each key, the EPG constructs a query which
24 interprets the data as possibly representing a number or one of the letters
25 associated with the numeric key. The EPG then executes the query to identify any

1 EPG data item (i.e., channel, program, network, etc.) that satisfies the query. As
2 the viewer continues to enter digits, the EPG constructs and executes queries to
3 continuously narrow the list until only a few EPG data items satisfy them.

4 With reference to the example shown in Fig. 15, suppose the viewer is
5 interested in watching the Orlando Magic basketball team. The viewer activates
6 the quick find window 300 and begins entering the word "Magic." The viewer
7 first depresses the "6"-key, which has the associated letters M, N, and O, to enter
8 the letter "M" in "Magic." The EPG constructs a query for all EPG items
9 beginning with the digit "6," "M," "N," or "O." In Boolean logic terms, the query
10 is represented as follows:

11
12 Query 1 = 6* or M* or N* or O*

13
14 The symbol "*" means that any digit or digits can follow the number or
15 letter shown. The query returns a long list of items, including the following
16 examples:

17
18 Query 1: 6* or M* or N* or O*

19 MTV

20 Chicago Bulls at Orlando Magic

21 Seattle Mariners v. Boston Red Sox

22 Market Wrap

23 Magical World of Science

24 Magic Kingdom at Disney World

25 Orlando Magic v. Chicago Bulls

1 Nashville Live

2 NBC

3 Nick-at-Night

4 Outer Limits

5 Oprah

6 Channel 6

7 Channel 61

8 :

9 :

10
11 The viewer next depresses the "2"-key, which has the associated letters A,
12 B, and C, to enter the letter "a" in "Magic." The EPG constructs a query for all
13 EPG items in the first list having a next digit beginning with "2," "A," "B," or
14 "C." In Boolean logic terms, the query is represented as follows:

15 Query 2 = 62* or MA* or MB* or MC* or NA* or NB* or NC*
16 or OA* or OB* or OC*

17 The query returns a shorter list of items, including the following examples:

18
19 Query 2

20 Chicago Bulls at Orlando Magic

21 Seattle Mariners v. Boston Red Sox

22 Market Wrap

23 Magical World of Science

24 Magic Kingdom at Disney World

25 Orlando Magic v. Chicago Bulls

1 Nashville Live

2 NBC

3 Channel 62

4 Channel 621

5 :

6 :

7
8 The viewer next depresses the “4”-key, which has the associated letters G,
9 H, and I, to enter the letter “g” in “Magic.” The EPG constructs a query for all
10 EPG items in the first list having a next digit beginning with “4,” “G,” “H,” or “I.”
11 In Boolean logic terms, the query is represented as follows:

12
13 Query 3 = 624* or MAG* or MAH* or MAI* or MBG* or MBH* ...
14 ... or OCG* or OCH* or OCI*

15
16 The query returns a much shorter list of items, including the following:

17
18 Query 3

19 Chicago Bulls at Orlando Magic

20 Magical World of Science

21 Magic Kingdom at Disney World

22 Orlando Magic v. Chicago Bulls

23 Channel 624
24
25

1 By entry of the third digit—the letter “g”—the list of possible programs,
2 networks and channels has been dramatically reduced to a short list that can be
3 presented to the viewer. If the viewer continues to enter the letters “i” and “c” in
4 “Magic,” the list is pared down to four items shown in the quick find window 300
5 in Fig. 15. The viewer can then choose a program from the list by clicking on the
6 appropriate program title. In response, the viewer computing unit tunes to the
7 channel carrying the selected program.

8 An alternative technique to searching on each number or letter is to pre-map
9 the program and network names into associated identification numbers which can
10 be stored as part of the data record in the EPG database. For instance, the network
11 name MTV has an associated identification number “688,” where the letter “M” is
12 mapped to the number “6,” the letter “T” is mapped to the number “8,” and the
13 letter “V” is mapped to the number “8.” With this pre-mapped identification
14 number, the EPG can simply search on each numerical data and return all channel
15 numbers, and all programs with identification numbers satisfying the query.

16 The quick find feature is very useful to the viewer. The viewer need not use
17 the remote keyboard to enter names of programs or networks (although the
18 keyboard may be used). Instead, the viewer enters the data using the 10-key
19 keypad on the remote control handset and the EPG simultaneously considers all
20 possible meanings of the data. Although this may seem laborious, entry of just a
21 few digits (e.g., 3 to 6) is often sufficient to reduce the set of possible channel
22 numbers, programs, and network names to only a few which can be conveniently
23 displayed to the viewer.

24 The quick find feature is described above as performing a new set of
25 queries after each digit is entered. However, the EPG can be alternatively

1 configured to await entry of multiple digits before performing the queries. For
2 instance, the EPG can keep track of the sequence of entered digits, and the various
3 permutations of possible letter combinations within the sequence, and then
4 subsequently perform queries on those possibilities.

5 It is noted that the above example describes the viewer as entering data
6 using a keypad on the remote control handset. In other embodiments, the EPG is
7 configured to present a keypad of soft buttons (i.e., buttons shown as part of the
8 graphical UI on the monitor) which the viewer can select using a handset or some
9 other remote device to enter the data. Additionally, the viewer can enter channel
10 numbers, program names, and network names using the remote keyboard.

11 It is noted that the term "program" is represented in examples as traditional
12 television shows, or movies. The term "program" is not to be limited, however, to
13 only these forms of programming. The term "program" is to be given a broad
14 meaning, including any type of information or data that can be carried over a
15 network or stored locally. Examples of "programs" include TV-like shows,
16 movies, games, interactive supplemental data, financial records or programs,
17 educational materials, communications records, software, document files, and the
18 like.

19 The query-base EPG system described herein is advantageous because it
20 effectively decouples the association of channel from network and programs. The
21 viewer can create simple queries to search on prearranged categories or complex
22 queries to search across arbitrary fields. The EPG permits viewers to merge their
23 individual queries into a composite query, which offers tremendous convenience
24 for groups of viewers. The EPG also permits a viewer to save queries in a
25

1 convenient hierarchic structure. The saved queries can also be loaded into a start
2 menu for execution each time the viewer boots the viewer computing unit.

3 The invention has been described in language more or less specific as to
4 structural and methodical features. It is to be understood, however, that the
5 invention is not limited to the specific features described, since the means herein
6 disclosed comprise preferred forms of putting the invention into effect. The
7 invention is, therefore, claimed in any of its forms or modifications within the
8 proper scope of the appended claims appropriately interpreted in accordance with
9 the doctrine of equivalents.